CLAIMS

1. Method of indexing a digital image, characterised in that it comprises the following steps:

- generating (S31) a first information item (H(Im)) characteristic of the visual content of the said image (Im);

- generating (S32) a second information item (W(Im)) characteristic of the spatial distribution of the visual content of the image (Im) in its image plane;

- associating (S33), with the said image (Im), an index (IDX(Im)) composed of the said first information item (H(Im)) and the said second information item (W(Im)).

2. Digital image indexing method according to Claim 1, characterised in that the step of generating the said first information item (H(Im)) comprises the following substeps:

- dividing (S310) the image plane of the said image (Im) according to a partitioning comprising a predefined number N of blocks (B_i);

- extracting (S312), from each of the said blocks (B_i), a data item of a first type (h_i^{Im}) representing at least one characteristic of the visual content of the block under consideration;

- generating (S315) the said first information item (H(Im)) as being a vector having N components, each of which is one of the said data items of the first type (h_i^{Im}).

3. Digital image indexing method according to Claim 2, characterised in that the step of generating the said second information item (W(Im)) comprises the following substeps:

- calculating, for each of the said blocks (B_i), a data item of a second type (w_i^{Im}) indicative of a degree of significance of the visual content of

the block (B_i) under consideration with respect to the overall content of the said image (Im);

- generating (S32) the said second information item (W(Im)) as being a vector having N components, each of which is one of the said data items of the second type (w_i^{Im}).

4. Image indexing method according to Claim 3, characterised in that, for each of the said blocks (B_i), the said data item of a second type (w_i^{Im}), indicative of a degree of significance of the visual content of the block (B_i) under consideration with respect to the overall content of the said image (Im), is obtained by applying the following formula:

$$w_i^{Im} = \frac{\left\| h_i^{Im} \right\|}{\sum_{i=1}^{N} \left\| h_i^{Im} \right\|}$$

according to which the said data item of the second type (w_i^{Im}) is obtained by calculating the ratio between the Euclidean norm of the data item (h_i^{Im}) of the first type associated with the block (B_i) under consideration and the sum of the Euclidean norms of the data items of the first type associated with all the blocks of the image (Im).

5. Image indexing method according to any one of Claims 2 to 4, characterised in that the image plane of the said image (Im) is divided according to a rectangular grid.

6. Image indexing method according to Claim 5, characterised in that the said predefined number N of blocks is equal to sixteen.

7. Digital image indexing method according to Claim 2, characterised in that:

- the image plane of the said image (Im) is divided according to a quadtree decomposition process by means of which, at each phase of the decomposition, a block under consideration, referred to as the "parent block" (B_p), is decomposed into four blocks, referred to as "child blocks" (B_f^p), equal in size to a quarter the size of the parent block, and whose combination gives the parent block, the said decomposition beginning with the overall image plane

of the said image (Im) and finishing when the predefined number N of blocks is reached;

- at each phase of the decomposition, there is calculated, for each of the said child blocks (B_f^p), a data item (w_f^p) of a second type, indicative of a degree of significance of the visual content of the child block under consideration with respect to the overall visual content of the parent block (B_p); and

- the said second information item (W(Im)) is composed of the set of the said data items (w_f^p) of the second type stored according to a quadtree structure, each node of which is constituted by one of the said data items of the second type.

8. Image indexing method according to Claim 7, characterised in that:

- at each phase of the quadtree decomposition of the said image (Im), there is extracted, from the parent block (B_p) under consideration, a data item (h_p) of the first type representing at least one characteristic of its visual content and, for each child block (B_f^p) obtained by decomposition of the said parent block (B_p), there is extracted a data item (h_f^p) of the first type representing at least one characteristic of the visual content of the child block under consideration;

- the said data item (w_f^p) of the second type indicative of a degree of significance of the visual content of a child block (B_f^p) under consideration with respect to the overall visual content of the corresponding parent block (B_p) is obtained by applying the following formula:

$$w_f^p = \frac{\|h_f^p\|}{\|h_p\|}$$

according to which the said data item of the second type (w_f^p) calculated for a child block under consideration (B_f^p) is obtained by calculating the ratio between the Euclidean norm of the data item (h_f^p) of the first type extracted for the said child block (B_f^p) under consideration and the Euclidean norm of the data item (h_p) of the first type extracted from the corresponding parent block (B_p).

9. Image indexing method according to any one of Claims 2 to 8, characterised in that each of the said data items of the first type, representing at least one characteristic of the visual content of a block under consideration of the said image, represents the distribution of colours in the said block.

10. Method of searching for images, from an example image, in a database in which digital images are stored, characterised in that the said example image and each of the images stored in the database are indexed according to an image indexing method in accordance with any one of the previous claims.

11. Image search method according to Claim 10, characterised in that it comprises the following steps:

- calculating (S609) a first similarity (Filter) between the said example image (Q) and each of the images (D) amongst a predefined plurality of stored images, the said first similarity being calculated from the said second information items (W(Q) ; W(D)) associated respectively with the said example image (Q) and the stored image (D) under consideration;

- providing (S617) a first subset of images selected (S615) from amongst the said predefined plurality of images according to their degree of first similarity (Filter) with the said example image (Q);

- calculating (S623) a second similarity (Match) between the said example image (Q) and each of the images (Ds) amongst the said first subset of selected images, the said second similarity being calculated from the said first information items (H(Q) ; H(Ds) associated respectively with the said example image (Q) and the selected image (Ds) under consideration;

- providing (S631) at least one image referred to as a result image, the said at least one result image being selected (S629) from amongst the said first subset of selected images, according to its degree of second similarity (Match) with the said example image.

12. Image search method according to Claim 11 when it is combined with any one of Claims 3 to 6, characterised in that the step (S609) of calculating a first similarity (Filter) between the said example image (Q) and each of the images (D) amongst a predefined plurality of stored images is implemented by calculating a distance between the second information item (W(Q)) associated with the said example image and the second information item (W(D)) associated with the said stored image under consideration (D).

13. Image search method according to Claim 11 when it is combined with Claim 7 or 8, characterised in that the step (S609) of calculating a first similarity (Filter) between the said example image (Q) and each of the images (D) amongst a predefined plurality of stored images is implemented by an isomorphism detection method applied to the quadtrees representing the said second information items (W(Q) ; W(D)) associated respectively with the said example image (Q) and the stored image (D) under consideration.

14. Image search method according to any one of Claims 11 to 13, characterised in that the step of calculating a second similarity (Match) between the said example image (Q) and each of the images (Ds) amongst the said first subset of selected images is implemented by calculating a distance between the first information item (H(Q)) associated with the said example image and the first information item (H(D)) associated with the said stored image under consideration (D).

15. Image search method according to Claim 14, characterised in that the step of calculating the said second similarity (Match) is implemented by calculating the sum of the distances between each of the components (h_i^Q) of the first information item (H(Q)) associated with the example image (Q) and the corresponding component (h_i^{Ds}) of the first information item (H(Ds)) associated with the stored image (Ds) under consideration.

16. Image search method according to Claim 15, characterised in that each of the components (h_i^Q , h_i^{Ds}) of the said first information items (H(Q), H(D)) associated with the example image (Q) and with the stored image (Ds) under consideration is a colour histogram and the said sum of the distances between these components is the sum of the intersections between these components.

17. Digital data processing device, characterised in that it comprises means adapted to implement an image indexing method according to any one of Claims 1 to 9.

18. Digital data processing device, characterised in that it comprises means adapted to implement an image search method according to any one of Claims 10 to 16.

19. Digital data processing device, characterised in that it comprises means adapted to implement an image indexing method according to any one of Claims 1 to 9, and means adapted to implement an image search method according to any one of Claims 10 to 16.

20. Computer, characterised in that it comprises a digital data processing device according to Claim 17 or 18.

21. A computer program comprising program instructions for causing a computer to perform an image indexing method according to any one of Claims 1 to 9.

22. A computer readable medium having thereon a computer program comprising computer executable instructions for causing a computer to perform an image indexing method according to any one of Claims 1 to 9.

23. A computer program comprising program instructions for causing a computer to perform an image search method according to any one of Claims 10 to 16.

24. A computer readable medium having thereon a computer program comprising computer executable instructions for causing a computer to perform an image search method according to any one of Claims 10 to 16.